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**Controlling Chemical Weapons in the Information Age
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As Delivered

Mr. Director-General, Ambassadors, Colleagues,

I am honored to speak today in this important room. I appreciate the opportunity to join the permanent representatives of States Parties to the Chemical Weapons Convention, and disarmament and nonproliferation colleagues in support of *The Hague Week on Disarmament and Non-proliferation*, as well as the 15th Anniversary of the Organization for the Prohibition of Chemical Weapons. We can all be proud of the great strides we have made toward eliminating an entire category of weapons of mass destruction since the Convention's entry into force in 1997.

We will soon be approaching another anniversary. The Cuban Missile Crisis happened fifty years ago this October. We have come a long way since then, but today arms control is at a crossroads. We are facing new challenges and entering new terrain. We have not tried to limit non-deployed or non-strategic weapons before, which President Obama called for the day he signed the New Strategic Arms Reduction Treaty (New START) in April 2010 in Prague. We are thinking about how we would verify reductions in those categories and people have different ideas about what terms like 'non-strategic' even mean. Even more

complicated: the lower the numbers and the smaller the components, the harder it will be to monitor compliance. To make matters more complicated, other weapons of mass destruction—chemical and biological weapons—pose even greater verification challenges, because they are dual use and difficult to disentangle from normal industrial or commercial processes.

In order to deal with these new problems, we are going to need innovative ideas about how together, we can improve and augment the tools needed for the verification of treaties and agreements controlling weapons of mass destruction, as well as create new ones.

Today, I'd like to talk to you about one such idea—the incorporation of publicly available technologies and social networking into arms control verification and monitoring. Now it is important to point out that this is not a policy speech, this is an ideas speech. I've been making similar remarks around Europe and at universities and think tanks in the United States. The first incarnation was delivered at Stanford University for the “Drell Lecture,” named for noted arms control expert and physicist, Sidner Drell. The purpose of that lecture series is to think of new ideas for arms control. We have ambitious goals and we will need big ideas to meet them. It is also important to note that while I will focus on arms control, these ideas could lend themselves to nonproliferation policy, and safeguards policy as well.

Nowadays, we verify that countries are fulfilling their arms control treaty obligations through a combination of information exchange, notifications of weapon status—where in the country *is* that ICBM?—on-site inspections, and National Means, including so-called National Technical Means (NTM). NTM are

big assets—observation satellites, phased-array radars—that individual countries manage and control. It has long been a rule of arms control treaties that we don't interfere with each other's National Technical Means—we allow each other these eyes and ears to monitor treaties. All of the elements I've listed off work together to make an effective verification regime.

I should say what we mean in the United States by effective verification.

Ambassador Paul Nitze defined it as follows: “if the other side moves beyond the limits of the treaty in any militarily significant way, we would be able to detect such violations in time to respond effectively and thereby deny the other side the benefit of the violation.” In our view, that's effective verification, and it has been the benchmark for verifying compliance in the United States. To help meet this benchmark, I've been asking myself, can we incorporate publicly available information technologies and social networking into arms control verification and monitoring?

Our new reality is a smaller, increasingly-networked world where the average citizen connects to other citizens in cyberspace hundreds of times each day. These people are exchanging and sharing ideas on a wide variety of topics: why not put this vast problem-solving entity to good use?

Today, any event, anywhere on the planet, can be broadcast globally in seconds. That means it is harder to hide things. When it is harder to hide things, it is easier to be caught. The neighborhood gaze is a powerful tool, and it can help us make sure that countries are following the rules of arms control treaties and agreements.

Open Source Information Technologies and Social Networking

But how exactly can publicly available information technologies improve arms control verification? Social verification can take place on a scale that moves from active participation, like public reporting and crowd-sourced mapping and analysis, to passive participation, like ubiquitous sensing or data mining and analytics.

On this scale, the open source information technologies in use can improve arms control verification in at least two ways: either by generating new information, or by analyzing information that is already publicly available.

Let me give you some examples, to give you an idea what I'm talking about.

In 2009, in recognition of the 40th anniversary of the Internet, the U.S. Defense Advanced Research Projects Agency (DARPA) held a competition where 10 red weather balloons were moored at visible fixed locations around the continental United States. The first team to identify the location of all 10 balloons won a sizable cash prize--\$40,000. Over 4,300 teams composed of an estimated 2 million people from 25 countries took part in the challenge. A team from the Massachusetts Institute of Technology won the challenge, identifying all of the balloon locations in an astonishingly short time of 8 hours and 52 minutes. Of course, to win in such a short time or complete the challenge at all, the MIT team did not "find" the balloons themselves. They tapped into social networks using a unique incentive structure that not only incentivized people to identify a balloon location, but also incentivized people to recruit others to the team. The MIT win showed the enormous potential of social networking, and also demonstrated how incentives can motivate large populations to work toward a common goal.

Social networking is already being incorporated into local safety and emergency response systems. RAVEN911—the Regional Asset Verification & Emergency Network—is a multilayer mapping tool that supports emergency first response in Cincinnati, Ohio. RAVEN911 uses live data feeds and intelligence gathered through Twitter to provide details that cannot be given on an everyday geographic map, such as the location of downed electric power lines and flooded roads. Authorities are cooperating with communities throughout the region to develop and implement this emergency management system, in order to help fire departments assess the risks and potential dangers before arriving on the scene of an accident or incident. This open source system gives emergency responders a common operating picture, to better execute time-critical activities, such as choosing evacuation routes out of flooded areas.

In addition to collecting useful data, the ability to identify patterns and trends in social networks could aid the arms control verification process. In the most basic sense, social media can draw attention to both routine and abnormal events. We may be able to mine Twitter data to understand where strange effluents are flowing, or to recognize unexpected patterns of industrial activity at a chemical production plant. In this way, we may be able to ensure better compliance with existing arms control treaties and regimes, such as the Chemical Weapons Convention (CWC).

Sound far-fetched? Just consider that even today, tablets such as your iPad have tiny accelerometers installed – that’s what tells the tablet which way is up. But the accelerometers also have the capability to detect small shakes, like an earth tremor.

Now, imagine a whole community of tablet users, all containing an “earth shake” app, dispersed randomly around the country, and connected into a centralized network node. An individual shake could be something as simple as bumping your iPad on a table. But a whole network of tablets, all shaking at the same time? That tells you that something happened; knowing where all the tablets are and the exact time they started shaking can help you to geo-locate the event. It could be an earthquake, or it could be an illicit nuclear test. Of course, other sensors and analysis would have to be brought to bear to figure out the difference.

This is called “ubiquitous sensing,” that is, collecting data and basic analysis through sensors on smartphones and other mobile-computing devices. These sensors would allow citizens to contribute to detecting potential treaty violations, and could build a bridge to a stronger private-public partnership in the realm of treaty verification.

Application to the CWC

Since we are here at the OPCW, I want to dive a little deeper into how this can apply to the CWC. Compliance with the CWC is already monitored through a comprehensive international system of declaration and international inspections. Could this already robust system be further integrated with publicly available information, providing independent confirmation of official conclusions? It is something to think about. The Advisory Panel on Future Priorities of the OPCW

has already identified this as an idea worth studying when it recommended that the organization should seek to find acceptable ways of using open source information to enhance the verification process back in 2011. Open source information covers a wide variety of data, including general media stories, self-reporting from companies and information officially released by governments.

A recent informal paper from the Technical Secretariat noted that open source information can support the work of the Secretariat and of States Parties in the implementation of the CWC and the task of ensuring destruction of chemical weapons and working to prevent their re-emergence. The paper details a number of ways that publicly available information is already used within the Secretariat for purposes related to verification. The paper then goes on to suggest several additional ways that publicly available information might be applicable. I applaud this effort to explore these ideas, whether or not those particular suggestions turn out to be useful to the Organisation.

The Challenges Ahead

Of course, for any of this to work, there are technical, legal and political barriers ahead that would need to be overcome—it is no easy feat to pursue these ideas.

On the technical front, it would be necessary to work together to make sure nations – or industries – cannot spoof or manipulate the public verification challenges that they devise. We also have to bear in mind there could be limitations based on the freedoms available to the citizens in particular countries.

On the legal front, there are many questions that must be confronted about active vs. passive participation. How can we prevent governments from extracting information from citizens without their knowledge, or manipulating results collected in databases? Further, in some circumstances, how can active participants be sheltered from reproach by authorities? It may be possible, through careful handling and management, to mask sources of information, even if locations are public.

On the political front, we cannot assume that information will always be so readily available. As nations and private entities continue to debate the line between privacy and security, it is possible to imagine that we are now living in a golden age of open source information that will be harder to take advantage of in future. These questions deserve to be considered.

Conclusion

In the end, the goal of using open source information technology and social networks should be to augment our existing arms control verification capabilities, and I challenge this community to think about how it can be done.

As you leave here today, I challenge you to help us find new ways to use the new information tools at our disposal to move the world closer to successfully tackling the control and elimination of all weapons of mass destruction. If we were clever enough to invent these weapons, then surely we are clever enough to get rid of them.

Thank you again for inviting me here to speak. I would now be happy to take some questions.